tives being present on such occasions. Otherwise there is a danger of their mathematical teaching running into a narrow groove. In regard to future meeting-places of the congress, this matter is, of course, decided at the final meeting in April, but it may not be out of place to express the hope that the congress of 1912 will be held somewhere within the British Isles. G. H. BRYAN.

PREHISTORIC CHEMISTRY.

ANCIENT Egypt always exercises an intense fascination for the student of the past, particularly as its written records are amplified by its "human documents" in the shape of mummies. This interest has, during the past few years, been intensified by the valuable series of anatomical studies on mummified remains which have issued from the Government School of Medicine at Cairo under the auspices of Prof. Elliot Smith. Not the least important of these is from the pen of Mr. W. A. Schmidt,[1] who has investigated mummified material of different epochs from the chemical and biological point of view. Some of the mummies he worked with carry us back to prehistoric periods, 6000 years ago, before the art of embalming as practised in later times was known to the inhabitants of the Nile valley.

It is remarkable that, in spite of this lapse of time, organic materials, which of all others are liable to decay, should still manifest in the test-tube their characteristic reactions. The presence of solid and volatile fatty acids, proteins, and cholesterin, with traces of intact fat, was demonstrable. The high percentage of fatty acids leads the author to the conclusion that they originate, not wholly from fat, but mainly from the body proteins. The formation of adipocere in the muscles of corpses left in water or buried in damp soil was adduced by the French observers in their work at the Morgue in Paris as evidence of the possible conversion of protein into fatty material. At the present time, however, the doctrine of the metabolic change of protein into fat is regarded with scepticism by most physiologists, in spite of the large amount of fatty acid radicals in the protein molecule.

The mummy protein, although it retains the general characters of albuminous material, has lost those specific properties which enable us to distinguish that of human origin from that which is found in other parts of the animal kingdom. In other words, it no longer gives what is termed the "biological reaction." This is disappointing, although it was doubtless expected. Mr. Schmidt also found that he could no longer detect hæmoglobin, and the substance regarded as blood by previous observers was doubtless composed of coloured gum and resin employed in embalming. In reference to the process of embalming itself, he was unable to find any soda; the so-called natrium bath really consisted of a solution of common salt. The old Egyptians simply pickled their corpses in brine, and the various balsams used were mere accessories which could have exerted no real influence on the process of mummification. The real agent at work here was undoubtedly the extraordinarily dry climate of Egypt, and it is this also which has acted as a preservative of the organic material which can still be identified.

The research reminds me of a small piece of work which was carried out by Dr. Otto Rosenheim[2] in my laboratory a few years ago. Small pieces of the carapace of a fossil Eurypterid were placed at his disposal by Sir E. Ray Lankester and Mr. Bather, of the Natural History Museum, and he was able to demonstrate in them the presence of chitin, their organic substratum. In this case one was dealing with prehistoric material compared with which an Egyptian mummy is quite recent. This kind of work appeals to the imagination, and one can only hope that if it is continued, still further light and interest will be thrown on the records of past ages.

W. D. HALLIBURTON.

[1] "Chemische und biologische Untersuchungen von ägyptischen Mumienmaterial, nebst Betrachtungen über das Einbalsamierungsverfahren der alter Ägypter." (Published in Max Verworn's *Zeitsch. f. allg. Physiol.*, vol. vii., pp. 369-392, 1907.)

[2] "Chitin in the Carapace of the *Pterygotus osiliensis* from the Silurian Rocks of Oesel" (Proc. Roy. Soc., vol. lxxvi., B, pp. 398-400, 1905).

DR. H. C. SORBY, F.R.S.

ON March 9, Dr. Henry Clifton Sorby, F.R.S., died, aged eighty-two, at his residence in Sheffield. The news of his death, although not unexpected, was received in the city of steel with profound regret, and those who had had the privilege of knowing Dr. Sorby felt that science had lost one of her greatest sons and that Sheffield must now look back upon "another yesterday." It is a little difficult for many of the inhabitants of "steelopolis" to realise that never again can they see the familiar figure hurrying along with bowed head, or the grave face, with, in its eyes, that far-off look which sees things beyond the ken of most men.

It is more than a little sad for those who could venture to intercept him with a "Good morning, Doctor," to know that never more can they receive his semi-startled, ultra-courteous recognition and hearty handshake, or again hear the cheery, almost laughing "*Good* morning. How are you?"

Combined with a complete absence of self-consciousness, two great personal characteristics of Dr. Sorby (which much handicapped him from the worldly point of view of non-scientific honours) were modesty and an immovable love of truth. The characteristic last named somewhat dimmed the brilliancy and lucidity of his papers, since in an enunciation he could never bring himself to omit any possible or even improbable qualification concerning the accuracy of the particular theory he happened to be formulating from his observed facts.

As a speaker Dr. Sorby could not claim to be an orator, but he had, nevertheless, a peculiar style all his own, by means of which he fully conveyed his meaning to his sympathetic audiences. Dr. Sorby belonged to a past generation of men of science the like of whom the world will do well to breed again. He loved science for her own sake, but so far from holding the view that science applied was science degraded, his almost child-like pleasure on hearing that some of his discoveries had been of practical use in the great workaday world was good to see. Dr. Sorby was not a family man, and though in easy circumstances he laboriously devoted his life to scientific research. The fact that those services to science were never adequately rewarded remains a permanent disgrace to the powers that be.

Turning from personal matters to the works of this great man of science, the writer is confronted by the fact that he must attempt the impossible task of compressing into a few hundred words an account of the labours of a versatile genius spread over a period of nearly sixty years, and embodied in about 240 papers, a number which, taking into consideration the length of Sorby's scientific life, corresponds to an average of four papers *per annum*.

His first research on sulphur and phosphorus in agricultural crops was published in 1847; his last paper on geology was written a few months before his death.

In 1849 Sorby founded the science of petrography, preparing in that year the first rock section ever examined by transmitted light. His alleged "wild ideas" as to the capabilities of this method were laughed at by the authorities of the period. Indeed, for a young man, not long past his teens, to attempt to upset the generally accepted dictum of de Saussure that mountains could not be examined by microscopes was regarded as bordering on presumption. In the early 'fifties, Sorby was much engaged on the subjects of the crystalline tetramorphism of carbon and the vexed question of slaty cleavage. In connection with the latter, in spite of rebukes, he persisted in his work, and in 1857 the young man of science buried both the electric and the 45° theories, by proving that slaty cleavage was due to the fact that lateral pressure on argillaceous rocks compressed them in one direction, elongated them in another, thus setting the small particles with their longest dimensions parallel, and so developing the characteristic structure in a plane perpendicular to the pressure.

In 1856 Sorby enunciated his now generally accepted theory that the Cleveland ironstone hills had been originally calcium carbonate, which had been gradually replaced by carbonate of iron derived from associated strata.

In the organic world Sorby did much work on colouring matters, and in this connection, for practical value, his microspectroscopic examinations of blood perhaps stand first. In 1865 he described his "new form of spectrum microscope" and the results registered thereby before the British Association. Proceeding upon information published by Hoppe, and two years later (1864) in greater detail by Prof. Stokes, Sorby exhaustively examined the microspectroscopic properties of red and brown cruorine and hæmatin, and from these figured no less than seven characteristic absorption spectra, showing incidentally that well-marked bands could be obtained from a minute blood-stain when only one-thousandth part of a grain of colouring matter was present. The importance of such marvellously delicate analysis was at once obvious to medical men and public analysts liable to be called upon to give evidence in criminal cases.

Sorby, the "Father of Petrography," was also destined to become the Father of Metallography.[1] His pioneer discoveries in petrography led him to the sagacious conception that steel itself might be a crystallised igneous rock; and in February, 1864, he placed in the hands of metallurgists for all time a new and most valuable method of scientific investigation.

On that date he read before the Sheffield Literary and Philosophical Society a paper "On a New Method of Illustrating the Structure of Various Kinds of Blister Steel by Nature Printing." In this paper he revealed the cellular structure of hard blister steel. He then attempted to produce artificial meteorites, but his efforts were not attended with success, because, as is known now, his experimental conditions were unsuitable, and it was not until 1904 that an "artificial meteorite" was described in NATURE on November 10, p. 32.

Sorby (as evidenced by the numerous carefully dated and initialled iron and steel sections now in the writer's possession [2]) worked on iron and steel metallography during the years 1863, 1864 and 1865, and, taking into consideration the meagre chemical data then extant, his final theory as to the nature of steel seems almost of the order of inspiration. He described crystals of nearly pure iron as consisting probably of interfering cubes and octahedra, and after a lapse of nearly forty-three years the accuracy of his conclusions (with only sectional planes to guide him) remains unshaken. In his "pearly constituent" (now called pearlite) he discovered a mineral the importance of which to mankind is still in this, the steel age, imperfectly realised. His "intensely hard constituent" is the cementite of the modern metallographer. The pearly constituent Sorby described thus:—"The optical characters of this substance led me to conclude that it had a very fine laminar structure before I was able to prove it by the use of high powers. It seems difficult, if not impossible, to explain its structure by supposing that it is an accidental mixture, whereas the facts are easily explained, if we suppose that it exists as a *compound*[1] at a high temperature, and breaks up into a *mixture* on further cooling, as more fully described in my paper on the use of high powers. For this reason it will be convenient to retain the name *pearly constituent* with the understanding that, *as seen when cold,* it is a mixture."

Persistent attempts to disprove the accuracy of Sorby's views of the nature of pearlite have, up to the present, consistently failed. Sorby's efforts to analyse pearlite quantitatively by micrographic means were, from the very nature of the problem, unsuccessful. He provisionally suggested that the hard plates constituted about 33 per cent. of the mass. Subsequent researches have shown that analyses on planes of section are misleading. The quantitative determination of the percentage and composition of these plates in pearlite occupied (in the metallurgical laboratories which were founded at Sheffield, largely owing to the energy and interest of Dr. Sorby) a period of three years, 1891–4, and was only accomplished by a triple attack conducted (*a*) by the microscope; (*b*) by quasi-quantitative pyrometric measurements of the heat of transformation of pearlite; and (*c*) by differential chemical analysis of the carbides as distinguished from carbon. The result obtained and now generally accepted indicated that in pure pearlite the percentage of hard plates always approximates 13.

It would occupy an inordinate amount of space even to summarise the results of Sorby's work conducted on his yacht *Glimpse* in connection with marine zoology. Dr. Sorby was a member of the Established Church, and made considerable researches in ecclesiastical architecture.

In concluding, it may be remarked that the final answer to the more or less good-natured derision with which his first rock section was regarded in 1849 was given, not by Dr. Sorby himself, but fifty-seven years afterwards by a cloud of witnesses at the centenary meeting of the Geological Society in February, 1906. Then many of the most distinguished foreign and British petrographers sent to the invalid man of science the following special message, expressing their "profound conviction of the important service rendered to the branch of geological science which they cultivate by the pioneer labours of Dr. Henry Clifton Sorby. They deplore the circumstances which prevent him from joining them on this interesting occasion, but beg to be allowed to assure him of their great admiration of his life's work, of their filial regard and deep affection."

Of Dr. Sorby it cannot be said that a prophet has no honour in his own country. Amongst the

[1] The attempt made by an American writer to transfer this title to a Russian metallurgist is best answered by silence.

[2] Some years ago the writer was exhibiting Sorby's pioneer sections of iron and steel at the Royal Institution, and was asked by an interested spectator, "How much each are you asking for them?"

[1] This is now known as hardenite (writer's note).

most treasured possessions of the University of Sheffield will always remain the marble bust of Sorby at the entrance to the Firth Hall, and his portrait, which hangs in the council room. So—his "task accomplished and the long day done."

"Beyond the loom of the last lone star, through open darkness hurled
Further than rebel comet dared or hiving star-swarm swirled
Sits he with those that praise our God for that they served His world."

J. O. A.

NOTES.

WE regret to learn at the moment of going to press of the death of Sir John Eliot, K.C.I.E., F.R.S., who until recently was the distinguished head of the Indian Meteorological Service.

AT the anniversary meeting of the Royal Irish Academy on Monday, March 16, the following were elected as honorary members of the academy in the section of science:—Sir Archibald Geikie, K.C.B., F.R.S.; Prof. J. C. Kapteyn, Groningen; Prof. A. A. Michelson, Chicago; Prof. J. D. van der Waals, Amsterdam; and Dr. A. R. Wallace, F.R.S.

IT is understood that provision will be made by the Canadian Government in the estimates for the coming financial year for a grant of 25,000 dollars (5000*l*.) by the Dominion Parliament towards the expenses of the British Association's visit to Winnipeg next year. The city of Winnipeg itself proposes to make a grant of 5000 dollars (1000*l*.). The week of the meeting will probably be from August 25 to September 1, 1909.

A MEMORIAL to the late Sir Leopold McClintock is to be placed in Westminster Abbey, with the consent of the Dean and Chapter. The memorial will consist of an alabaster slab, underneath the monument to Sir John Franklin, whose fate was definitely ascertained by Sir Leopold during his celebrated expedition on board the *Fox*. The inscription will be as follows:—"Here also is commemorated Admiral Sir Leopold McClintock, 1819–1907. Discoverer of the Fate of Franklin in 1859." The expense of the memorial has been undertaken by the Royal Society, the Royal Geographical Society, and Trinity House.

THE Canadian Mining Institute is arranging, in connection with its summer meeting, a general excursion to the mineral districts of Nova Scotia, Quebec, Ontario, and British Columbia, starting towards the end of August next. Members of the Institution of Mining and Metallurgy have been invited to take part in the general excursion (or any part of it) on the same specially favourable conditions as will be accorded to its own members. The Dominion Government, and the various provincial governments concerned, will cooperate in making the excursion a success, and the occasion will afford an excellent opportunity for engineers to inspect the important mineral areas of the Dominion.

THE second International Conference on Sleeping Sickness, to the proceedings of which attention was directed in our issue of last week, has terminated without being able to agree on the draft convention before it. Reuter's Agency states that the French and Italian plenipotentiaries declared themselves unable to accept a proposal, made at the last conference in June and then unanimously recommended, for the establishment of a central bureau in London. It was proposed that the work connected with sleeping sickness should be taken over by a hygiene bureau to be established in Paris, but this proposal the German plenipotentiaries declined to accept, and they strongly supported the British plan for the establishment of a bureau in London. The president (Lord Strathcona), the vice-presidents, and council of the Royal Institute of Public Health gave a dinner on March 11 at the Hôtel Métropole "to meet the delegates of the International Sleeping Sickness Conference." Lord Strathcona presided, and in proposing the health of the delegates to the international conference hoped that the result of that and successive conferences will be, if not to eliminate, at all events to mitigate the great scourge of sleeping sickness. Dr. Koch, in reply, said it is but the duty of medical men to investigate diseases. Especially is this the case with countries which, on account of their colonies, are particularly interested in certain dangerous diseases. Dr. Cureau expressed the thanks of the French delegates. The Marquis de Villalobar, Prof. S. Liquido, Colonel Lantonnois, Dr. Kopke, and Sir Walter Foster also replied.

THE Bakerian lecture of the Royal Society will be delivered on Thursday next, March 26, by Prof. C. H. Lees, F.R.S., upon the subject of the thermal conductivities of solids.

WE have received a copy of the introductory number of *Neue Weltanschauung*, a scientific journal to be published at Stuttgart in monthly parts at fourpence each. It appears that a Neue Weltanschauung Society has been established at Stuttgart which is to issue, not only the monthly journal bearing the same name, but likewise another publication at irregular intervals. We shall be better able to judge of the merits of the former when we receive one of the regular numbers.

IN the March issue of *British Birds* Mr. N. F. Ticehurst records a number of bird-bones obtained by excavating an ancient mound known as the Broch of Ayre, near the Bay of Ayr, in Orkney. The most interesting of these is an imperfect leg-bone of the great auk, a species hitherto unknown from the Orkney mainland. It would, however, remarks the author, be rash to take the evidence of such a specimen as proof that the bird was once an inhabitant of the mainland.

No. 1579 of the Proceedings of the U.S. National Museum contains an interesting account of the mode of collecting the sap of the Mexican agave and manufacturing therefrom the national beverage known as *pulque*. When the agave is in the proper condition some of the leaves are stripped away so as to expose the central core of unfurled leaves; a year later the core is cut out bodily, and a hollow made in the base to serve as a reservoir for the limpid sap, which soon flows from the wound, and is stated to have a taste very like cocoanut-milk. The sap, or *aquamiel*, is drawn off by means of a siphon, and transported in skins to undergo fermentation, and thus be converted into pulque.

WE have been favoured with a reprint of a note published in the *American Naturalist* for December last, in which Mr F. T. Lewis disputes the commonly accepted view that the mimicry among South American butterflies is connected with birds. The original mimicry theory, it is explained, has been so extended as to embrace and account for not only resemblances between an edible and an inedible form, but also between two inedible species. The author now raises the question whether the re-